

A NEW METHOD TO DETECT THE TRUE ZERO-CROSSING POINTS
OF THE PHASE BACK EMF FOR SENSORLESS CONTROL OF
BRUSHLESS DC MOTORS

ABSTRACT

[0056] In the present system and method, ZCP level signals of each phase voltage are first obtained. Among the detected ZCP level signals, some ZCPs are generated by phase back EMF, which are true ZCPs and other ZCPs by commutations, which are false ZCPs. The duration of the false ZCP level outputs varies with the excited phase current, inductance and back EMF of motors, the present invention utilizes fixed-width narrow pulse signals corresponding to the rising and falling edges of the ZCP level outputs in order to eliminate influences of the earlier disclosed motor parameters. These fixed width pulse signals make up the ZCP pulse signal. Because the first edge of the plurality of false ZCP level signal substantially corresponds to the switching-off signal of the commutated-off excited phase, a first false ZCP masking signal having pulses wider than the ZCP pulse signal are applied to mask the first plurality of false ZCP signals. Comparing the logic values of the ZCP level signals, the pulses of the ZCP pulse signals are identified as true ZCPs when the logic values of the current pulse are different from the logic value of a preceding pulse. Correspondingly, if the logic value of the current pulse is the same as the logic value of the preceding pulse, the current pulse is a false ZCP. In these way, the phase-delay free and true zero-crossing points of all the phase back EMFs can be obtained with the simple circuit and logic processing.

(1) FIG.1 accompanies the abstract.